Construction Grants statutes [Section 23 of Pub. L. 97-147] that required U.S. EPA to provide allowance for alternative biological treatment technologies such as trickling filters or waste stabilization ponds. In response to this requirement, definition of secondary treatment was modified on September 20, 1984 and June 3, 1985, and published in the revised secondary treatment regulations contained in 40 C.F.R. section 133.105. These regulations allow alternative limitations for facilities using trickling filters and waste stabilization ponds that meet the requirements for "equivalent to secondary treatment." These "equivalent to secondary treatment" limitations are up to 45 mg/L (monthly average), up to 65 mg/L (weekly average), and a minimum of 65% removal concentration for BOD_5 and TSS.

In order to be eligible for equivalent-to-secondary limitations, a POTW must meet all of the following criteria as specified in 40 C.F.R. part 133.101(g) as follows:

a. The effluent concentrations consistently achievable through proper operations and maintenance is in excess of the secondary treatment standards set forth in 40 C.F.R. part 133.102(a) and (b) for BOD_5 and TSS.

b. The principal treatment process must be either a trickling filter or waste stabilization pond.

c. The treatment works provide significant biological treatment of municipal wastewater to consistently achieve a 30-day average of at least 65 percent removal of BOD_5.

2. Applicable Technology-Based Effluent Limitations

a. **BOD_5 and TSS.** Federal regulations at 40 C.F.R. part 133, establish the minimum weekly and monthly average level of effluent quality and 30-day average percent removal attainable by secondary treatment for BOD_5 and TSS. A daily maximum effluent limitation for BOD_5 and TSS is also included in the Order to ensure that the treatment works are not organically overloaded and operate in accordance with design capabilities.

The effluent concentrations consistently achievable through proper operations and maintenance is in excess of secondary treatment standards, the principal treatment process is waste stabilization ponds, and the treatment works provide significant biological treatment of municipal wastewater to consistently achieve a 30-day average of at least 65 percent removal of BOD_5.Therefore, this Facility meets all criteria of 40 C.F.R. part 133.101(g) and qualifies for equivalent-to-secondary limitations specified in 40 C.F.R. parts 133.105(a) and (b). These specify that the BOD and TSS 30-day average discharge limits shall not exceed 45 mg/L, the 7-day average shall not exceed 65 mg/L, and the 30-day BOD and TSS percent removal shall not be less than 65 percent.

b. **pH.** The secondary treatment regulations at 40 C.F.R. part 133 require that pH be maintained between 6.0 and 9.0 standard units.

Summary of Technology-based Effluent Limitations
Discharge Point D-001

Table F-5. Summary of Technology-based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
BOD_5	mg/L	45	65	90	-	-
	lbs/day[1]	375	542	751	-	-
	% Removal	65	-	-	-	-
Total Suspended Solids	mg/L	45	65	90		
	lbs/day[1]	375	542	751	-	-
	% Removal	65	-	-	-	-
pH	Standard units	-	-	-	6.0	9.0

[1] Based on an PWWF of 1.0 MGD

C. Water Quality-Based Effluent Limitations (WQBEL's)

1. Scope and Authority

CWA Section 301(b) and 40 C.F.R. section 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards.

Section 122.44(d)(1)(i) of 40 C.F.R. requires that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, WQBEL's must be established using: (1) U.S. EPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in section 122.44(d)(1)(vi).

The process for determining reasonable potential and calculating WQBEL's when necessary is intended to protect the designated uses of the receiving water as specified in the Basin Plan, and achieve applicable water quality objectives and criteria that are contained in other state plans and policies, or any applicable water quality criteria contained in the CTR and NTR.

Finally, 40 C.F.R. section 122(d)(1)(vii) requires effluent limits to be developed consistent with any available wasteload allocations developed and approved for the discharge.

2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, the Basin Plan implements State Water Board Resolution No. 88-63, which established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply.

The federal CWA section 101(a)(2), states: "*it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and for recreation in and on the water be achieved by July 1, 1983.*" Federal Regulations, developed to implement the requirements of the CWA, create a rebuttable presumption that all waters be designated as fishable and swimmable. Federal Regulations, 40 CFR sections 131.2 and 131.10, require that all waters of the State regulated to protect the beneficial uses of public water supply, protection and propagation of fish, shell fish and wildlife, recreation in and on the water, agricultural, industrial and other purposes including navigation. 40 C.F.R. section 131.3(e) defines existing beneficial uses as those uses actually attained after 28 November 1975, whether or not they are included in the water quality standards. Federal Regulation, 40 C.F.R. section 131.10 requires that uses be obtained by implementing effluent limitations, requires that all downstream uses be protected and states that in no case shall a state adopt waste transport or waste assimilation as a beneficial use for any waters of the United States.

a. **Receiving Water and Beneficial Uses.** Refer to III.C.1. above for a complete description of the receiving water and beneficial uses.

b. **Effluent and Ambient Background Data.** The reasonable potential analysis (RPA), as described in section IV.C.3 of this Fact Sheet, was based on data from 5/10/2015 through 5/09/2018, which includes effluent and ambient background data submitted in SMRs. Additional data outside of this range was also analyzed where there was inadequate data to perform an analysis, including data for priority pollutant constituents in an effluent sample taken January 2011.

c. **Assimilative Capacity/Mixing Zone.** The constituents with effluent limitations in this Order that are based on aquatic life criteria include ammonia (as nitrogen) and total recoverable copper.

   The CWA directs the states to adopt water quality standards to protect the quality of its waters. U.S. EPA's current water quality standards regulation authorizes states to adopt general policies, such as mixing zones, to implement state water quality standards (40 CFR § 122.44 and 122.45). The U.S. EPA allows states to have broad flexibility in designing its mixing zone policies. Primary policy and guidance on determining mixing zone and dilution credits is provided by the SIP and the Basin Plan. If no procedure applies in the SIP or the Basin Plan, then the Central Valley Water Board may use the U.S. EPA *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001)(TSD).

   For non-Priority Pollutant constituents the allowance of mixing zones by the Central Valley Water Board is discussed in the Basin Plan, *Policy for Application of Water Quality Objectives*, which states in part, "*In conjunction with the issuance of NPDES and storm water permits, the Regional Board may designate mixing zones within which water quality objectives will not apply provided the discharger has demonstrated to the satisfaction of the Regional Board that the mixing zone will not adversely impact beneficial uses. If allowed, different mixing zones may be designated for different types of objectives, including, but not limited to, acute aquatic life objectives, chronic aquatic life objectives, human health objectives, and acute and chronic whole effluent toxicity objectives, depending in part on the averaging period over which the objectives apply. In determining the size of such mixing zones, the Regional Board will consider the applicable procedures and guidelines in the EPA's Water Quality Standards Handbook and the [TSD]. Pursuant to EPA guidelines, mixing zones designated for acute aquatic life*

objectives will generally be limited to a small zone of initial dilution in the immediate vicinity of the discharge."

For Priority Pollutants, the SIP supersedes the Basin Plan mixing zone provisions. Section 1.4.2 of the SIP states, in part, "*…with the exception of effluent limitations derived from TMDL's, in establishing and determining compliance with effluent limitations for applicable human health, acute aquatic life, or chronic aquatic life priority pollutant criteria/objectives or the toxicity objective for aquatic life protection in a basin plan, the Regional Board may grant mixing zones and dilution credits to dischargers…The applicable priority pollutant criteria and objectives are to be met through a water body except within any mixing zone granted by the Regional Board.* ***The allowance of mixing zones is discretionary and shall be determined on a discharge-by-discharge basis.*** *The Regional Board may consider allowing mixing zones and dilution credits only for discharges with a physically identifiable point of discharge that is regulated through an NPDES permit issued by the Regional Board.*" [emphasis added]

For incompletely-mixed discharges, the Discharger must complete an independent mixing zone study to demonstrate to the Central Valley Water Board that a dilution credit is appropriate. In granting a mixing zone, Section 1.4.2.2 of the SIP requires the following to be met:

"***A mixing zone shall be as small as practicable****. The following conditions must be met in allowing a mixing zone:* [emphasis added]

A: A mixing zone shall not:

1. compromise the integrity of the entire water body;

2. cause acutely toxic conditions to aquatic life passing through the mixing zone;

3. restrict the passage of aquatic life;

4. adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws;

5. produce undesirable or nuisance aquatic life;

6. result in floating debris, oil, or scum;

7. produce objectionable color, odor, taste, or turbidity;

8. cause objectionable bottom deposits;

9. cause nuisance;

10. dominate the receiving water body or overlap a mixing zone from different outfalls; or

11. be allowed at or near any drinking water intake. A mixing zone is not a source of drinking water. To the extent of any conflict between this determination and the Sources of Drinking Water Policy (Resolution No. 88-63), this SIP supersedes the provisions of that policy."

Section 1.4.2.1 of the SIP establishes the authority for the Central Valley Water Board to consider dilution credits based on the mixing zone conditions in a receiving water. Section 1.4.2.1 in part states:

"The dilution credit, D, is a numerical value associated with the mixing zone that accounts for the receiving water entrained into the discharge. The dilution credit is a value used in the calculation of effluent limitations (described in Section 1.4).

Dilution credits may be limited or denied on a pollutant-by-pollutant basis, which may result in a dilution credit for all, some, or no priority pollutants in the discharge." [emphasis added]

Order R5-2009-0093 granted dilution credits of 20:1 for both acute and chronic toxicity mixing zones for total recoverable copper and ammonia, total as nitrogen. The dilution credits were based on a 2009 mixing zone analysis using the spreadsheet-style RIVPLUM5.XLS model. The model assumed a mixing zone that extended 100 feet downstream of the discharge and 15 feet on either side of the outfall. The Order required the Discharger to confirm, by a dye or tracer study, that the minimum dilution was 20:1 within the boundaries of the 100 foot mixing zone.

The Discharger completed a *Mixing Zone Dye Dilution Study* in September 2010 that demonstrated that a 20:1 dilution was achieved within 70 feet downstream of the point of discharge. The mixing zone generally remained at the bank of the river, due to a bridge footing and several grassy islands inhibiting the lateral migration of effluent across the channel such that the 20:1 dilution never extended horizontally to the midpoint of the river channel. Therefore, the 2010 Study confirms the minimum dilution is 20:1 within the boundaries of the 100 foot mixing zone but it is not completely mixed as defined by the SIP.

Dilution credits allowed for in this Order are in accordance with Section 1.4.2.2 of the SIP. The allowance of a mixing zone and dilution credits are a discretionary act by the Central Valley Water Board. The Central Valley Water Board has determined that the maximum dilution credit on a constituent-by-constituent basis needed for this discharge are 20 for ammonia (as nitrogen) and 6 for total recoverable copper, as discussed further in section IV.C.3.c.

To fully comply with all applicable laws, regulations and policies of the State, Central Valley Water Board approved a mixing zone and the associated dilution credits based on the following:

i. Mixing zones are allowed under the SIP provided all elements contained in Section 1.4.2.2 are met. Based on the mixing zone study conducted by the Discharger the Central Valley Water Board has determined that these factors are met.

ii. Section 1.4.2.2.of the SIP requires mixing zones to be as small as practicable. Based on the mixing zone study conducted by the Discharger the Central Valley Water Board has determined the mixing zone is as small as practicable.

iii. In accordance with Section 1.4.2.2 of the SIP, the Board has determined the mixing zone is as small as practicable, will not compromise the integrity of the entire water body, restrict the passage of aquatic life, dominate the water body or overlap existing mixing zones from different outfalls. The mixing zone is small (approximately 80 to 100 feet downstream of the discharge) relative to the large size of the receiving water, is not at or near a drinking water intake, and does not overlap a mixing zone from a different outfall.

iv. The Central Valley Water Board is allowing a mixing zone for aquatic life constituents only and has determined allowing such mixing zone will not cause acutely toxic conditions to aquatic life passing through the mixing zone.

v. The Central Valley Water Board has determined the discharge will not adversely impact biologically sensitive or critical habitats, including, but not

limited to, habitat of species listed under the federal or State endangered species laws, because the mixing zone is relatively small and acutely toxic conditions will not occur in the mixing zone. The discharge will not produce undesirable or nuisance aquatic life, result in floating debris, oil, or scum, produce objectionable odor, taste, or turbidity, cause objectionable bottom deposits, or cause nuisance, because the proposed Order establishes end-of-pipe effluent limitations (e.g., for BOD_5 and TSS) and discharge prohibitions to prevent these conditions from occurring.

vi. As required by the SIP, in determining the extent of or whether to allow a mixing zone and dilution credit, the Central Valley Water Board has considered the presence of pollutants in the discharge that are carcinogenic, mutagenic, teratogenic, persistent, bioaccumulative, or attractive to aquatic organisms, and concluded that the allowance of the mixing zone and dilution credit is adequately protective of the beneficial uses of the receiving water.

vii. The Central Valley Water Board has determined mixing zone complies with the SIP for priority pollutants.

viii. The mixing zone study indicates the maximum allowed dilution factor to be greater than 20:1 for aquatic life constituents. Section 1.4.2.2B of the SIP, in part states, *"The RWQCB shall deny or significantly limit a mixing zone and dilution credits as necessary to protect beneficial uses, meet the conditions of this Policy, or comply with other regulatory requirements."* The Central Valley Water Board has determined a dilution factor of greater than 20:1 is not needed or necessary for the Discharger to achieve compliance with this Order.

ix. The Central Valley Water Board has determined the mixing zone complies with the Basin Plan for non-priority pollutants. The Basin Plan requires a mixing zone not adversely impact beneficial uses. Beneficial uses will not be adversely affected for the same reasons discussed above. In determining the size of the mixing zone, the Central Valley Water Board has considered the procedures and guidelines in Section 5.1 of U.S. EPA's *Water Quality Standards Handbook*, 2nd Edition (updated July 2007) and Section 2.2.2 of the TSD. The SIP incorporates the same guidelines.

x. The Central Valley Water Board has determined that allowing dilution factors that exceed those proposed by this Order would not comply with the State Anti-degradation Policy for receiving waters outside the allowable mixing zone for ammonia (as nitrogen) and total recoverable copper. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16 (State Anti-Degradation Policy). The State Anti-Degradation Policy incorporates the federal antidegradation policy and requires that existing quality of waters be maintained unless degradation is justified based on specific findings. Item 2 of the State Anti-Degradation Policy states:

> *"Any activity which produces or may produce a waste or increased volume or concentration of waste and which dischargers or proposed to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."*

The effluent limitations established in the Order for ammonia (as nitrogen) and total recoverable copper that have been adjusted for dilution credits were developed based on performance of the Discharger's current wastewater treatment capabilities. Therefore, the Central Valley Water Board determined the effluent limitations required by this Order will result in the Discharger implementing best practicable treatment or control of the discharge necessary to assure that pollution or nuisance will not occur and the highest water quality consistent with maximum benefit to the people of the State will be maintained. The Central Valley Water Board also determined the Discharger will be in immediate compliance with the effluent limitations.

The Central Valley Water Board also determined establishing effluent limitations for ammonia (as nitrogen) and total recoverable copper that have been adjusted for dilution credits of 20 and 6, respectively, is consistent with Section 1.4.2.2B of the SIP that requires the Central Valley Water Board shall deny or significantly limit a mixing zone and dilution credits as necessary to comply with other regulatory requirements.

xi. Therefore, the Central Valley Water Board has determined the effluent limitations established in the Order for ammonia (as nitrogen) and total recoverable copper that have been adjusted for dilution credits of 20 and 6, respectively, are appropriate and necessary to comply with the Basin Plan, SIP, Federal anti-degradation regulations and the State Anti-Degradation Policy.

d. **Conversion Factors.** The CTR contains aquatic life criteria for arsenic, cadmium, chromium III, chromium VI, copper, lead, nickel, silver, and zinc which are presented in dissolved concentrations. U.S. EPA recommends conversion factors to translate dissolved concentrations to total concentrations. The default U.S. EPA conversion factors contained in Appendix 3 of the SIP were used to convert the applicable dissolved criteria to total recoverable criteria.

e. **Hardness-Dependent CTR Metals Criteria.** The CTR and the NTR contain water quality criteria for seven metals that vary as a function of hardness. The lower the hardness the lower the water quality criteria. The metals with hardness-dependent criteria include cadmium, copper, chromium III, lead, nickel, silver, and zinc.

This Order has established the criteria for hardness-dependent metals based on the hardness of the receiving water (actual ambient hardness) as required by the SIP[1] and the CTR[2]. The SIP and the CTR require the use of "receiving water" or "actual ambient" hardness, respectively, to determine effluent limitations for these metals. The CTR requires that the hardness values used shall be consistent with the design discharge conditions for design flows and mixing zones[3]. Where design flows for aquatic life criteria include the lowest one-day flow with an average reoccurrence frequency of once in ten years (1Q10) and the lowest average seven consecutive day flow with an average reoccurrence frequency of once in ten years (7Q10). [4] This section of the CTR also indicates that the design conditions should be established

[1] The SIP does not address how to determine the hardness for application to the equations for the protection of aquatic life when using hardness-dependent metals criteria. It simply states, in Section 1.2, that the criteria shall be properly adjusted for hardness using the hardness of the receiving water.

[2] The CTR requires that, for waters with a hardness of 400 mg/L (as $CaCO_3$), or less, the actual ambient hardness of the surface water must be used (40 C.F.R. § 131.38(c)(4)).

[3] 40 C.F.R. §131.3(c)(4)(ii)

[4] 40 C.F.R. §131.38(c)(2)(iii) Table 4

such that the appropriate criteria are not exceeded more than once in a three year period on average.[5] The CTR requires that when mixing zones are allowed the CTR criteria apply at the edge of the mixing zone, otherwise the criteria apply throughout the water body including at the point of discharge. [6] The CTR does not define the term "ambient," as applied in the regulations. Therefore, the Central Valley Water Board has considerable discretion to consider upstream and downstream ambient conditions when establishing the appropriate water quality criteria that fully complies with the CTR and SIP.

Summary findings

The ambient hardness for the Middle Fork of the Feather River is represented by the data in Figure F-1, below, which shows ambient hardness ranging from 28 mg/L to 65 mg/L based on collected ambient data from May 2015 through May 2018. Given the high variability in ambient hardness values, there is no single hardness value that describes the ambient receiving water for all possible scenarios (e.g., minimum, maximum). Because of this variability, staff has determined that based on the ambient hardness concentrations measured in the receiving water, the Central Valley Water Board has discretion to select ambient hardness values within the range of 28 mg/L (minimum) up to 65 mg/L (maximum). Staff recommends that the Board use the ambient hardness values shown in Table F-6 for the following reasons.

i. Using the ambient receiving water hardness values shown in Table F-6 will result in criteria and effluent limitations that ensure protection of beneficial uses under all ambient receiving water conditions.

ii. The Water Code mandates that the Central Valley Water Board establish permit terms that will ensure the reasonable protection of beneficial uses. In this case, using the lowest measured ambient hardness to calculate effluent limitations is not required to protect beneficial uses. Calculating effluent limitations based on the lowest measured ambient hardness is not required by the CTR or SIP, and is not reasonable as it would result in overly conservative limits that will impart substantial costs to the Discharger and ratepayers without providing any additional protection of beneficial uses. In compliance with applicable state and federal regulatory requirements, after considering the entire range of ambient hardness values, Board staff has used the ambient hardness values shown in Table F-6 to calculate the proposed effluent limitations for hardness-dependent metals. The proposed effluent limitations are protective of beneficial uses under all flow conditions.

iii. Using an ambient hardness that is higher than the minimum of 28 mg/L will result in limits that may allow increased metals to be discharged to the river, but such discharge is allowed under the State Antidegradation Policy (State Water Board Resolution 68-16). The Central Valley Water Board finds that this degradation is consistent with the antidegradation policy (see antidegradation findings in Section IV.D.4 of the Fact Sheet). The Antidegradation policy requires the Discharger to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that: a) a pollution or nuisance will not occur, and b) the highest water

[5] 40 C.F.R. §131.38(c)(2)(iii) Table 4, notes 1 and 2
[6] 40 C.F.R. §131.38(c)(2)(i)

quality consistent with maximum benefit to the people of the State will be maintained.

iv. Using the ambient hardness values shown in Table F-6 is consistent with the CTR and SIP's requirements for developing metals criteria.

Table F-6. Summary of CTR Criteria for Hardness-dependent Metals

CTR Metals	Ambient Hardness (mg/L)[2,3]	CTR Criteria (µg/L, total recoverable)[1]	
		acute	chronic
Copper	65	9.3	6.5
Chromium III	65	1220	145
Cadmium	63 (acute) 65 (chronic)	2.7	1.8
Lead	56	39	1.5
Nickel	65	326	36
Silver	56	1.5	--
Zinc	65	83	83

[1] Metal criteria rounded to two significant figures in accordance with the CTR (40 C.F.R. §131.38(b)(2)).
[2] The ambient hardness values in this table represent actual observed receiving water hardness measurements from the dataset shown in Figure F-1.
[3] The CTR's hardness dependent metals criteria equations vary differently depending on the metal, which results in differences in the range of ambient hardness values that may be used to develop effluent limitations that are protective of beneficial uses and comply with CTR criteria for all ambient flow conditions.

Background

The State Water Board provided direction regarding the selection of hardness in two precedential water quality orders; WQO 2008-0008 for the City of Davis Wastewater Treatment Plant (Davis Order) and WQO 2004-0013 for the Yuba City Wastewater Treatment Plant (Yuba City Order). The State Water Board recognized that the SIP and the CTR do not discuss the manner in which hardness is to be ascertained, thus regional water boards have considerable discretion in determining ambient hardness so long as the selected value is protective of water quality criteria under the given flow conditions. (Davis Order, p.10). The State Water Board explained that it is necessary that, "The [hardness] value selected should provide protection for all times of discharge under varying hardness conditions." (Yuba City Order, p. 8). The Davis Order also provides that, "Regardless of the hardness used, the resulting limits must always be protective of water quality criteria under all flow conditions." (Davis Order, p. 11)

The equation describing the total recoverable regulatory criterion, as established in the CTR, is as follows:

$$\text{CTR Criterion} = \text{WER} \times (e^{m[\ln(H)]+b}) \quad \text{(Equation 1)}$$

Where:

H = ambient hardness (as $CaCO_3$) [7]

WER = water-effect ratio

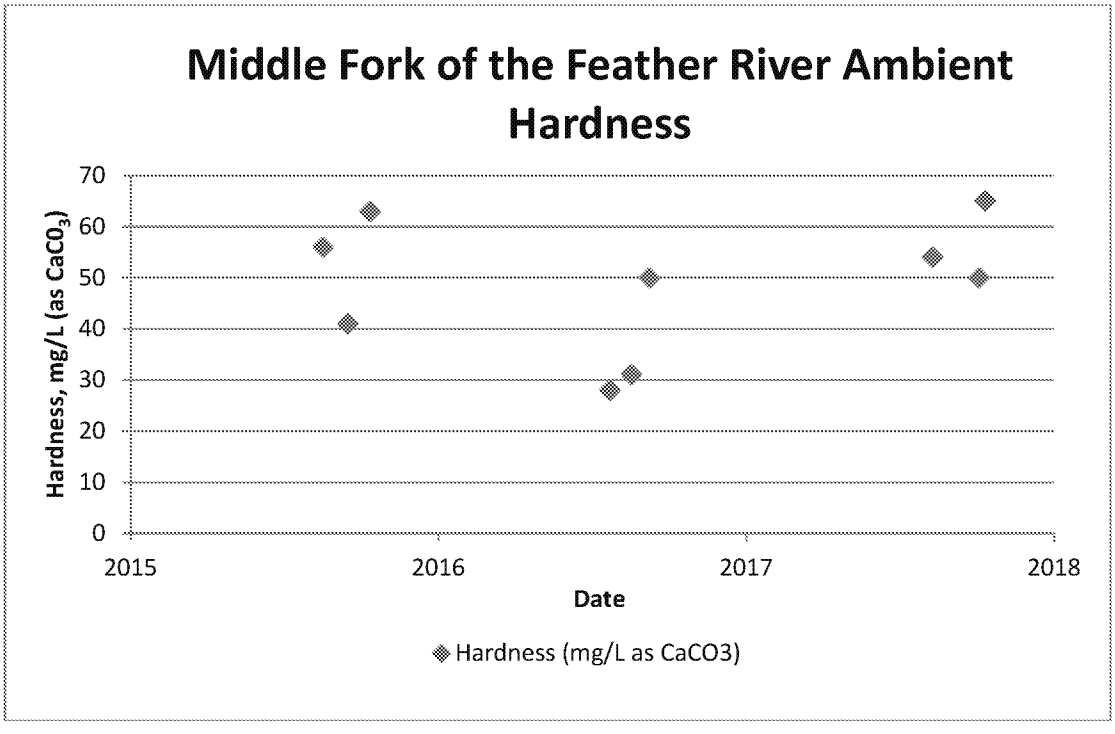
m, b = metal- and criterion-specific constants

The direction in the CTR regarding hardness selection is that it must be based on ambient hardness and consistent with design discharge conditions for design flows and mixing zones. Consistent with design discharge conditions and design flows means that the selected "design" hardness must result in effluent limitations under design discharge conditions that do not result in more than one exceedance of the applicable criteria in a three year period.[8] Where design flows for aquatic life criteria include the lowest one-day flow with an average reoccurrence frequency of once in ten years (1Q10) and the lowest average seven consecutive day flow with an average reoccurrence frequency of once in ten years (7Q10). Due to the discharge prohibition requiring at least 40 cfs in the Middle Fork of the Feather River to discharge from the Facility, the 1Q10 and 7Q10 Middle Fork of the Feather River flows are both set at 40 cfs.

Ambient conditions

The ambient receiving water hardness varied from 28 mg/L to 65 mg/L, based on **9** samples from May 2015 through May 2018 (see Figure F-1).

Figure F-1. Observed Ambient Hardness Concentrations 28 mg/L – 65 mg/L



[7] For this discussion, all hardness values are expressed in mg/L as $CaCO_3$.
[8] 40 C.F.R. §131.38(c)(2)(iii) Table 4, notes 1 and 2

In this analysis, the entire range of ambient hardness concentrations shown in Figure F-1 were considered to determine the appropriate ambient hardness to calculate the CTR criteria and effluent limitations that are protective under all discharge conditions.

Approach to derivation of criteria

As shown above, ambient hardness varies substantially. Because of the variation, there is no single hardness value that describes the ambient receiving water for all possible scenarios (e.g., minimum, maximum, mid-point). While the hardness selected must be hardness of the ambient receiving water, selection of an ambient receiving water hardness that is too high would result in effluent limitations that do not protect beneficial uses. Also, the use of minimum ambient hardness would result in criteria that are protective of beneficial uses, but such criteria may not be representative considering the wide range of ambient conditions.

Reasonable worst-case ambient conditions. To determine whether a selected ambient hardness value results in effluent limitations that are fully protective while complying with federal regulations and state policy, staff have conducted an analysis considering varying ambient hardness and flow conditions. To do this, the Central Valley Water Board has ensured that the receiving water hardness and criteria selected for effluent limitations are protective under "reasonable-worst case ambient conditions." These conditions represent the receiving water conditions under which derived effluent limitations would ensure protection of beneficial uses under all ambient flow and hardness conditions.

Reasonable worst-case ambient conditions:

- "Low receiving water flow." Reasonable worst case receiving water flow conditions have been set at 40 cfs based on the prohibition in this Order.

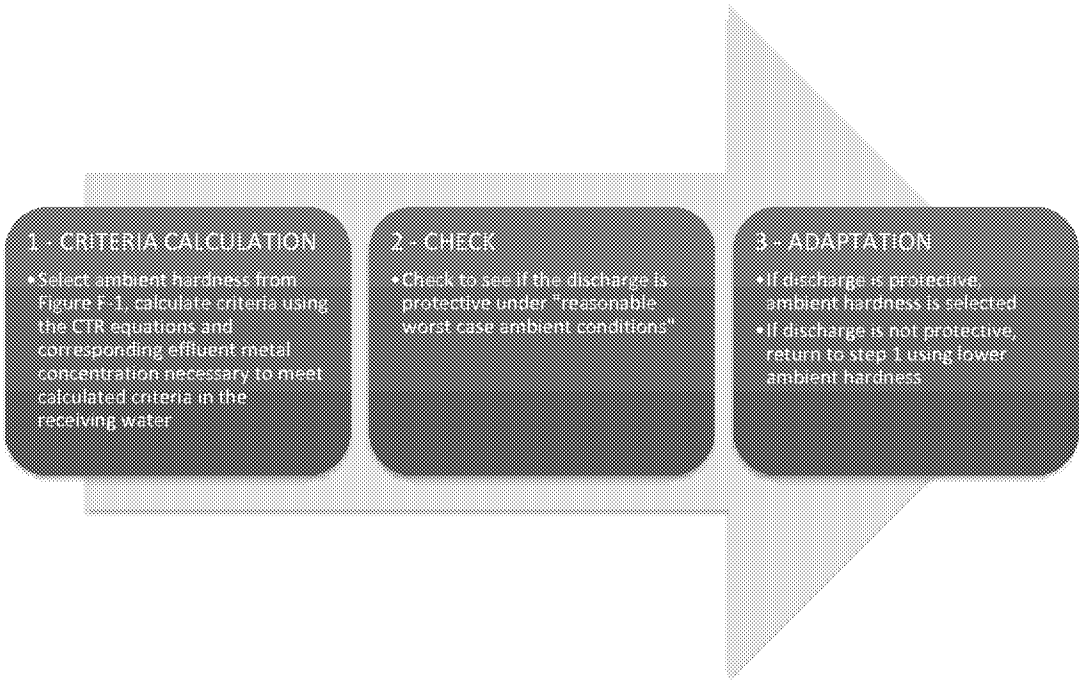
- "High receiving water flow (maximum receiving water flow)." This additional flow condition has been selected consistent with the Davis Order, which required that the hardness selected be protective of water quality criteria under all flow conditions.

- "Low receiving water hardness." The minimum receiving water hardness condition of 28 mg/L was selected to represent the reasonable worst case receiving water hardness.

- "Background ambient metal concentration at criteria." This condition assumes that the metal concentration in the background receiving water is equal to CTR criteria (upstream of the facility's discharge). Based on data in the record, this is a design condition that has not occurred in the receiving water and is used in this analysis to ensure that limits are protective of beneficial uses even in the situation where there is no assimilative capacity.

Iterative approach. An iterative analysis has been used to select the ambient hardness to calculate the criteria that will result in effluent limitations that protect beneficial uses under all flow conditions.

The iterative approach is summarized in the following algorithm and described below in more detail.



1. CRITERIA CALCULATION. CTR criteria are calculated using the CTR equations based on actual measured ambient hardness sample results, starting with the maximum observed ambient hardness of 65 mg/L. Effluent metal concentrations necessary to meet the above calculated CTR criteria in the receiving water are calculated in accordance with the SIP.[9] This should not be confused with an effluent limit. Rather, it is the Effluent Concentration Allowance (ECA), which is synonymous with the wasteload allocation defined by U.S. EPA as "a definition of effluent water quality that is necessary to meet the water quality standards in the receiving water."[10] If effluent limits are found to be needed, the limits are calculated to enforce the ECA considering effluent variability and the probability basis of the limit.

2. CHECK. U.S. EPA's simple mass balance equation[11] is used to evaluate if discharge at the computed ECA is protective. Resultant downstream metal concentrations are compared with downstream calculated CTR criteria under reasonable worst-case ambient conditions.

3. ADAPT. If step 2 results in:

   (A) receiving water metal concentration that complies with CTR criteria under reasonable worst-case ambient conditions, then the hardness value is selected.

[9] SIP Section 1.4.B, Step 2, provides direction for calculating the Effluent Concentration Allowance.
[10] U.S. EPA Technical Support Document for Water Quality-based Toxics Control (TSD), pg. 96.
[11] U.S. EPA NPDES Permit Writers' Handbook (EPA 833-K-10-001 September 2010, pg. 6-24)

(B) receiving water metal concentration greater than CTR criteria, then return to bullet 1, selecting a lower ambient hardness value.

The CTR's hardness dependent metals criteria equations contain metal-specific constants, so the criteria vary depending on the metal. Therefore, steps 1 through 3 must be repeated separately for each metal until ambient hardness values are determined that will result in criteria and effluent limitations that comply with the CTR and protect beneficial uses for all metals.

Results of iterative analysis

The above iterative analysis for each CTR hardness-dependent metal results in the selected ambient hardness values shown in Table F-6, above. Using these hardness values to calculate criteria, which are actual sample results collected in the receiving water, will result in effluent limitations that are protective under all ambient flow conditions. Copper and silver are used as examples below to illustrate the results of the analysis. Tables F-7 and F-8 below summarize the numeric results of the three step iterative approach for copper and silver. As shown in the example tables, ambient hardness values of 65 mg/L (copper) and 56 mg/L (silver) are used in the CTR equations to derive criteria and effluent limitations. Then under the "check" step, worst-case ambient receiving water conditions are used to test whether discharge results in compliance with CTR criteria and protection of beneficial uses.

The results of the above analysis, summarized in the tables below, show that the ambient hardness values selected using the three-step iterative process results in protective effluent limitations that achieve CTR criteria under all flow conditions. Tables F-7 and F-8 below, summarize the critical flow conditions. However, the analysis evaluated all flow conditions to ensure compliance with the CTR criteria at all times.

Table F-7. Verification of CTR Compliance for Copper

Receiving water hardness used to compute effluent limitations				**65 mg/L**
Effluent Concentration Allowance (ECA) for Copper[2]				**6.5 µg/L**
	Downstream Ambient Concentrations Under Worst-Case Ambient Receiving Water Conditions			**Complies with CTR Criteria?**
	Hardness	**CTR Criteria (µg/L)**	**Ambient Copper Concentration[1] (µg/L)**	
1Q10	28.72	3.213	3.206	**Yes**
7Q10	28.72	3.213	3.206	**Yes**
Max receiving water flow	28.00	3.144	3.144	**Yes**

[1] This concentration is derived using worst-case ambient conditions. These conservative assumptions will ensure that the receiving water always complies with CTR criteria.

[2] The ECA defines effluent quality necessary to meet the CTR criteria in the receiving water. This Order includes average monthly and maximum daily effluent limits for copper of 26 µg/L and 53 µg/L, respectively. The effluent limits were calculated per section 1.4 of the SIP, which ensures compliance with the ECA considering effluent variability and the probability basis of each effluent limit.

Table F-8.Verification of CTR Compliance for Silver

Receiving water hardness used to compute effluent limitations				**56 mg/L**
Effluent Concentration Allowance (ECA) for Silver[2]				**1.5 µg/L**
	Downstream Ambient Concentrations Under Worst-Case Ambient Receiving Water Conditions			**Complies with CTR Criteria?**
	Hardness	**CTR Criteria (µg/L)**	**Ambient Silver Concentration[1] (µg/L)**	
1Q10	28.72	0.475	0.474	**Yes**
7Q10	28.72	0.475	0.474	**Yes**
Max receiving water flow	28.00	0.455	0.455	**Yes**

1 This concentration is derived using worst-case ambient conditions. These conservative assumptions will ensure that the receiving water always complies with CTR criteria.

2 The ECA defines effluent quality necessary to meet the CTR criteria in the receiving water. There is no effluent limitation for silver as it demonstrates no reasonable potential.

3. Determining the Need for WQBEL's

Clean Water Act section 301(b)(1)(C) requires effluent limitations necessary to meet water quality standards, and 40 C.F.R. § 122.44(d) requires NPDES permits to include conditions that are necessary to achieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality. Federal regulations at 40 C.F.R 122.44(d)(1)(i) state, "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." Additionally, 40 C.F.R. section 122(d)(1)(vii) requires effluent limits to be developed consistent with any available wasteload allocations developed and approved for the discharge. The process to determine whether a WQBEL is required as described in 40 C.F.R. § 122.44(d)(1)(i) is referred to as a reasonable potential analysis or RPA. Central Valley Water Board staff conducted RPA's for nearly 200 constituents, including the 126 U.S. EPA priority toxic pollutants. This section includes details of the RPA's for constituents of concern for the Facility. The entire RPA is included in the administrative record and a summary of the constituents of concern is provided in Attachment G. For priority pollutants, the SIP dictates the procedures for conducting the RPA. For non-priority pollutants the Central Valley Water Board is not restricted to one particular RPA method, therefore, the RPA's have been conducted based on EPA guidance considering multiple lines of evidence and the site-specific conditions of the discharge.

a. **Constituents with Total Maximum Daily Load (TMDL).** 40 C.F.R. § 122.44(d)(1)(vii) provides: *"When developing water quality-based effluent limits under [§ 122.44(d)(1)], the permitting authority shall ensure that: (A) The level of water quality to be achieved by limits on point sources established under this paragraph is derived from, and complies with all applicable water quality standards; and (B) Effluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by*

the State and approved by EPA pursuant to [Total Maxiumum Daily Loads regulations]." U.S. EPA construes 40 C.F.R. § 122.44(d)(1)(vii)(B) to mean that "when WLAs are available, they must be used to translate water quality standards into NPDES permit limits." 54 Fed. Reg. 23868, 23879 (June 2, 1989).

The Middle Fork of the Feather River (Sierra Valley to Lake Oroville, Butte and Plumas Counties) is subject to a TMDL for toxicity, but none has been completed. The Central Valley Water Board considered WQBEL's for this pollutant pursuant to 40 C.F.R. section 122.44(d)(1)(vii), which does not require or contemplate a reasonable potential analysis.

b. **Constituents with No Reasonable Potential.** Central Valley Water Board staff conducted reasonable potential analyses for nearly 200 constituents, including the 126 U.S. EPA priority toxic pollutants. All reasonable potential analyses are included in the administrative record and a summary of the constituents of concern is provided in Attachment G. WQBEL's are not included in this Order for constituents that do not demonstrate reasonable potential to cause or contribute to an instream excursion of an applicable water quality objective; however, monitoring for those pollutants is established in this Order as required by the SIP. If the results of effluent monitoring demonstrate reasonable potential, this Order may be reopened and modified by adding an appropriate effluent limitation.

Most constituents with no reasonable potential are not discussed in this Order. This section only provides the rationale for the reasonable potential analyses for the following constituents of concern that were found to have no reasonable potential after assessment of the data:

i. **Aluminum**

Aluminum is the third most abundant element in the earth's crust and is ubiquitous in both soils and aquatic sediments. When mobilized in surface waters, aluminum has been shown to be toxic to various fish species. However, the potential for aluminum toxicity in surface waters is directly related to the chemical form of aluminum present, and the chemical form is highly dependent on water quality characteristics that ultimately determine the mechanism of aluminum toxicity. Surface water characteristics, including pH, temperature, colloidal material, fluoride and sulfate concentrations, and total organic carbon, all influence aluminum speciation and its subsequent bioavailability to aquatic life. Calcium [hardness] concentrations in surface water may also reduce aluminum toxicity by competing with monomeric aluminum (Al^{3+}) binding to negatively charged fish gills.

(a) **WQO.** The State Water Board Division of Drinking Water (DDW) has established Secondary Maximum Contaminant Levels (MCLs) to assist public drinking water systems in managing their drinking water for public welfare considerations, such as taste, color, and odor. The Secondary MCL for aluminum is 200 µg/L for protection of the MUN beneficial use. Title 22 requires compliance with Secondary MCLs on an annual average basis.

The Code of Federal Regulations promulgated criteria for priority toxic pollutants for California's surface waters as part of section 131.38 Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California (California Toxics Rule or CTR), including metals criteria.

However, aluminum criteria were not promulgated as part of the CTR. Absent numeric aquatic life criteria for aluminum, WQBEL's in the Central Valley Region's NPDES permits are based on the Basin Plans' narrative toxicity objective. The Basin Plans' *Policy for Application of Water Quality Objectives* requires the Central Valley Water Board to consider, "*on a case-by-case basis, direct evidence of beneficial use impacts, all material and relevant information submitted by the discharger and other interested parties, and relevant numerical criteria and guidelines developed and/or published by other agencies and organizations. In considering such criteria, the Board evaluates whether the specific numerical criteria which are available through these sources and through other information supplied to the Board, are relevant and appropriate to the situation at hand and, therefore, should be used in determining compliance with the narrative objective*." Relevant information includes, but is not limited to (1) USEPA Ambient Water Quality Criteria (NAWQC) and subsequent Correction, (2) site-specific conditions of the Sacramento River, the receiving water, and (3) site-specific aluminum studies conducted by dischargers within the Central Valley Region. (Basin Plan, p. IV.-17.00; see also, 40 CFR 122.44(d)(vi).)

USEPA NAWQC. USEPA recommended the NAWQC aluminum acute criterion at 750 µg/L based on test waters with a pH of 6.5 to 9.0. USEPA also recommended the NAWQC aluminum chronic criterion at 87 µg/L based upon the following two toxicity tests. All test waters contained hardness at 12 mg/L as $CaCO_3$.

(1) Acute toxicity tests at various aluminum doses were conducted in various acidic waters (pH 6.0 – 6.5) on 159 and 160-day old striped bass. The 159-day old striped bass showed no mortality in waters with pH at 6.5 and aluminum doses at 390 µg/L, and the 160-day old striped bass showed 58% mortality at a dose of 174.4 µg/L in same pH waters. However, the 160-day old striped bass showed 98% mortality at aluminum dose of 87.2 µg/L in waters with pH at 6.0, which is USEPA's basis for the 87 µg/L chronic criterion. The varied results draw into question this study and the applicability of the NAWQC chronic criterion of 87 µg/L.

(2) Chronic toxicity effects on 60-day old brook trout were evaluated in circumneutral pH waters (6.5-6.9 pH) in five cells at various aluminum doses (4, 57, 88, 169, and 350 µg/L). Chronic evaluation started upon hatching of eyed eggs of brook trout, and their weight and length were measure after 45 days and 60 days. The 60-day old brook trout showed 24% weight loss at 169 µg/L of aluminum and 4% weight loss at 88 µg/L of aluminum, which is the basis for USEPA's chronic criteria. Though this test study shows chronic toxic effects of 4% reduction in weight after exposure for 60-days, the chronic criterion is based on 4-day exposure; so again, the applicability of the NAWQC chronic criterion of 87 µg/L is questionable.

Site-specific Conditions. USEPA advises that a water effects ratio may be more appropriate to reflect the actual toxicity of aluminum to aquatic organisms when the pH and hardness conditions of the receiving water

are not similar to that of the test conditions.[12] Effluent and the Middle Fork of the Feather River monitoring data indicate that the pH and hardness values are not similar to the low pH and hardness conditions under which the chronic criterion for aluminum was developed, as shown in the table below, and therefore, the Central Valley Water Board does not expect aluminum to be as toxic in the Middle Fork of the Feather River as in the previously described toxicity tests. The pH of the Middle Fork of the Feather River, the receiving water, ranged from 6.3 to 8.5 with a median of 7.7 based on 27 monitoring results obtained between February 2016 and April 2018. These water conditions typically are circumneutral pH where aluminum is predominately in the form of $Al(OH)_3$ and non-toxic to aquatic life. The hardness of the Middle Fork of the Feather River ranged from 28 mg/L to 65 mg/L, based on 9 samples from February 2016 and April 2018, which is above the conditions, and thus less toxic, than the tests used to develop the chronic criterion.

Parameter	Units	Test Conditions for Applicability of Chronic Criterion	Effluent	Receiving Water
pH	standard units	6.0-6.5	6.9-8.7	6.3-8.5
Hardness, Total (as $CaCO_3$)	mg/L	12	66-100	28-65
Aluminum, Total Recoverable	µg/L	87.2-390	50-210	N/A

Local Environmental Conditions and Studies. Twenty-one site-specific aluminum toxicity tests have been conducted within the Central Valley Region. The pH and hardness of the Middle Fork of the Feather River are similar, as shown in the table below, and thus the results of these site-specific aluminum toxicity tests are relevant and appropriate for the Middle Fork of the Feather River. As shown in the following table, all EC_{50}[13] toxicity results are at concentrations of aluminum above 5,000 µg/L. Thus, the toxic effects of aluminum in these surface waters and in the Middle Fork of the Feather River, is less toxic (or less reactive) to aquatic species then demonstrated in the toxicity tests that USEPA used for the basis of establishing the chronic criterion of 87 µg/L. This new information, and review of the toxicity tests USEPA used to establish the chronic criterion, indicates that 87 µg/L is overly stringent and not applicable to the Middle Fork of the Feather River.

[12] "The value of 87 micro-g/L is based on a toxicity test with striped bass in water with pH = 6.5-6.6 and hardness < 10 mg/L. Data in [a 1994 Study] indicate that aluminum is substantially less toxic at higher pH and hardness, but the effects of pH and hardness are not well quantified at this time." USEPA 1999 NAWQC Correction, Footnote L

[13] The effect concentration is a point estimate of the toxicant concentration that would cause an observable adverse effect (e.g. death, immobilization, or serious incapacitation) in a given percent of the test organisms, calculated from a continuous model (e.g. Probit Model). EC_{50} is a point estimate of the toxicant concentration that would cause an observable adverse effect in 50 percent of the test organisms. The EC_{50} is used in toxicity testing to determine the appropriate chronic criterion.

Central Valley Region Site-Specific Aluminum Toxicity Data

Discharger	Test Waters	Hardness Value	Total Aluminum EC_{50} Value	pH	WER
Oncorhynchus mykiss **(rainbow trout)**					
Manteca	Surface Water/Effluent	124	>8600	9.14	N/C
Auburn	Surface Water	16	>16500	7.44	N/C
Modesto	Surface Water/Effluent	120/156	>34250	8.96	>229
Yuba City	Surface Water/Effluent	114/164[1]	>8000	7.60/7.46	>53.5
Ceriodaphnia dubia **(water flea)**					
Auburn	Effluent	99	>5270	7.44	>19.3
	Surface Water	16	>5160	7.44	>12.4
Manteca	Surface Water/Effluent	124	>8800	9.14	N/C
	Effluent	117	>8700	7.21	>27.8
	Surface Water	57	7823	7.58	25.0
	Effluent	139	>9500	7.97	>21.2
	Surface Water	104	>11000	8.28	>24.5
	Effluent	128	>9700	7.78	>25.0
	Surface Water	85	>9450	7.85	>25.7
	Effluent	106	>11900	7.66	>15.3
	Surface Water	146	>10650	7.81	>13.7
Modesto	Surface Water/Effluent	120/156	31604	8.96	211
Yuba City	Surface Water/Effluent	114/164[1]	>8000	7.60/7.46	>53.5
Placer County (SMD 1)	Effluent	150	>5000	7.4 – 8.7	>13.7
Daphnia magna **(water flea)**					
Manteca	Surface Water/Effluent	124	>8350	9.14	N/C
Modesto	Surface Water/Effluent	120/156	>11900	8.96	>79.6
Yuba City	Surface Water/Effluent	114/164[1]	>8000	7.60/7.46	>53.5

The Discharger has not conducted a toxicity test for aluminum; however, the City of Manteca conducted toxicity tests in the San Joaquin River. As shown, the water quality characteristics of the San Joaquin River near Manteca are similar for pH and hardness in the Middle Fork of the Feather River, with a hardness of 57 mg/L as $CaCO_3$ in comparison to the hardness of the Middle Fork of the Feather River near the discharge that averages 48.6 mg/L as $CaCO_3$. Thus, results of the site-specific study conducted on the San Joaquin River near Manteca are representative of the Middle Fork of the Feather River near the discharge. Therefore, the City of Manteca aluminum toxicity study is relevant for use in determining the specific numerical criteria to be used in determining compliance with the Basin Plan's narrative toxicity objective. The City of Manteca aluminum toxicity study resulted in a minimum site-specific aluminum objective of 7,823 µg/L. Thus, these results support the conclusion that the 87 µg/L chronic criterion is overly stringent for the Middle Fork of the Feather River near the discharge.

Applicable WQOs. This Order implements the Secondary MCL of 200 µg/L as an annual average for the protection of MUN and implements the Basin Plan's narrative toxicity objective for the protection of aquatic life using an acute (1-hour) criterion and chronic (4-day) criterion of 750 µg/L based on USEPA's NAWQC and the discussion above.

(b) **RPA Results.** For priority pollutants, the SIP dictates the procedures for conducting the RPA. Aluminum is not a priority pollutant. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Due to the site-specific conditions of the discharge, the Central Valley Water Board has used its judgment in determining the appropriate method for conducting the RPA for this non-priority pollutant constituent.

The maximum annual average effluent concentration for aluminum was 130 µg/L, below the Secondary MCL of 200 µg/L. Therefore, aluminum in the discharge does not have a reasonable potential to cause or contribute to an in-stream excursion above the Secondary MCL of 200 µg/L.

ii. **Iron**

(a) **WQO**. The Secondary MCL – Consumer Acceptance Limit for total recoverable iron is 300 µg/L, which is used to implement the Basin Plan's chemical constituent objective for the protection of municipal and domestic supply.

(b) **RPA Results**. For priority pollutants, the SIP dictates the procedures for conducting the RPA. Iron is not a priority pollutant. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Due to the site-specific conditions of the discharge, the Central Valley Water Board has used its judgment in determining the appropriate method for conducting the RPA for this non-priority pollutant constituent. The most stringent objective is the Secondary MCL, which is derived from human welfare considerations (e.g., taste, odor, laundry staining), not for toxicity. Secondary MCL's are drinking water standards contained in Title 22 of the California Code of Regulations. To be consistent with how compliance with the standards is determined, the Central Valley Water Board conducts the RPA for iron based on the calendar year annual average effluent iron concentrations.

The annual average for dissolved iron during the last three years for five total samples is 138 µg/L, below the Secondary MCL of 300 µg/L. Therefore, iron in the discharge does not have a reasonable potential to cause or contribute to an in-stream excursion above the Secondary MCL of 300 µg/L.

iii. **Cyanide**

(a) **WQO.** The CTR includes criteria for the protection of freshwater aquatic life for cyanide. The applicable acute (1-hour average) and chronic (4-day average) criteria for the effluent are 22 µg/L and 5.2 µg/L, respectively.

(b) **RPA Results.** Cyanide was detected in the effluent once in 12 samples (since Order R5-2009-0093 became effective) on 13 January 2017 at a concentration of 33 µg/L. Cyanide was reported as non-detect in one receiving water sample upstream of the Facility. No sources of cyanide are expected in the service area of the treatment facility. In addition, some recent work has shown that the sodium hydroxide preservative used in the cyanide test produces some false positive readings. Therefore, the one detection is not representative of the Facility effluent and the discharge does not exhibit reasonable potential to cause or contribute to an exceedance of the Basin Plan water quality objectives for cyanide.

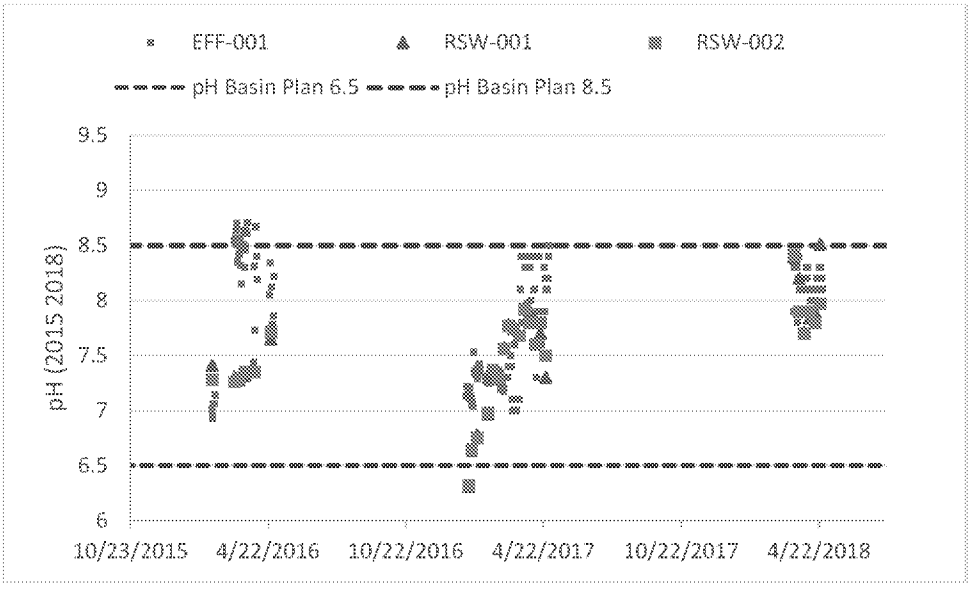
iv. **pH**

(a) **WQO.** The Basin Plan includes a water quality objective for surface waters (except for Goose Lake) that the *"…pH shall not be depressed below 6.5 nor raised above 8.5."*

(b) **RPA Results.** Federal regulations at 40 C.F.R. §122.44(d)(1)(i) requires that, "*Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.*" For priority pollutants, the SIP dictates the procedures for conducting the RPA. pH is not a priority pollutant. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Due to the site-specific conditions of the discharge, the Central Valley Water Board has used professional judgment in determining the appropriate method for conducting the RPA for this non-priority pollutant constituent.

The effluent ranged from 6.9 to 8.7 based on 167 samples collected between May 2015 and May 2018. The upstream receiving water pH ranged from 6.3 to 8.5 based on 27 samples during the same time frame.

As shown in the figure blow, data collected between May 2015 and May 2018 indicates that background receiving water pH has exceeded the lower boundary of the water quality objectives for pH but not the upper bound. Due to the large amount of dilution in the Middle Fork of the Feather River (observed larger than the 50:1 discharge prohibition), it does not appear that effluent discharge has any effect on the downstream pH in the receiving water. Data collected on 4/24/2018 shows an upstream receiving water value of 8.5 and a downstream value of 8.0, while the effluent was 8.5. Since the downstream value decreased after the addition of effluent, this suggests that the data collected on this day is not representative of the actual conditions of the receiving water.



Based on the effluent and receiving water data and the minimum 50:1 dilution ratio, the Central Valley Water Board finds that the discharge does not exhibit reasonable potential to cause or contribute to an exceedance of the Basin Plan water quality objectives for pH. Therefore, this Order does not include WQBEL's for pH. However, as discussed in section IV.B.2 of this Fact Sheet, this Order includes technology-based minimum and maximum effluent limitations of 6.0 and 9.0, respectively, based on the secondary treatment standards at 40 C.F.R. part 133.

c. **Constituents with No Data or Insufficient Data.** Reasonable potential cannot be determined for the following constituents because effluent data are limited or ambient background concentrations are not available. The Discharger is required to continue to monitor for these constituents in the effluent using analytical methods that provide the best feasible detection limits. When additional data become available, further analysis will be conducted to determine whether to add numeric effluent limitations or to continue monitoring.

i. **Manganese**

(a) **WQO**. The Secondary MCL – Consumer Acceptance Limit for manganese is 50 µg/L, which is used to implement the Basin Plan's chemical constituent objective for the protection of municipal and domestic supply.

(b) **RPA Results**. For priority pollutants, the SIP dictates the procedures for conducting the RPA. Manganese is not a priority pollutant. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Due to the site-specific conditions of the discharge, the Central Valley Water Board has used its judgment in determining the appropriate method for conducting the RPA for this non-priority pollutant constituent. The most stringent objective is the Secondary MCL, which is derived from human welfare considerations (e.g., taste, odor, laundry staining), not for toxicity. Secondary MCL's are drinking water standards contained in Title 22 of the California Code of Regulations. To be consistent with how compliance with the standards is determined, the Central Valley Water Board conducts the RPA for manganese based on the calendar year annual average effluent manganese concentrations.

The dataset used in the RPA for total recoverable manganese is limited to two data points with an average of 313 µg/L. However, there is no RSW-001 data provided by the Discharger for manganese in the receiving water upstream of the Facility.

Due to the limited effluent data and receiving water data, the Central Valley Water Board finds that the dataset is insufficient to determine if the discharge exhibits reasonable potential to cause or contribute to an exceedance of the Secondary MCL on an annual average basis. No sources of manganese are expected in the service area of the Facility and based on the high dilution of the effluent in the Middle Fork of the Feather River, the discharge does not likely have reasonable potential to cause or contribute to an exceedance of the Secondary MCL. Therefore, this Order does not establish WQBEL's for total recoverable manganese. Instead of limitations, quarterly effluent monitoring for total recoverable manganese has been established. Should monitoring results indicate that the discharge has the reasonable potential to cause or contribute to an

exceedance of the Secondary MCL, this Order may be reopened and modified by adding appropriate effluent limitations.

d. **Constituents with Reasonable Potential.** The Central Valley Water Board finds that the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a water quality standard for ammonia, chlorine residual, total recoverable copper, pathogens, and salinity. WQBEL's for these constituents are included in this Order. A summary of the RPA is provided in Attachment G, and a detailed discussion of the RPA for each constituent is provided below.

i. **Ammonia**

(a) **WQO.** The 1999 U.S. EPA National Ambient Water Quality Criteria (NAWQC) for the protection of freshwater aquatic life for total ammonia (the "1999 Criteria"), recommends acute (1-hour average; criteria maximum concentration or CMC) standards based on pH and chronic (30-day average; criteria continuous concentration or CCC) standards based on pH and temperature. U.S. EPA also recommends that no 4-day average concentration should exceed 2.5 times the 30-day CCC.

The U.S. EPA recently published national recommended water quality criteria for the protection of aquatic life from the toxic effects of ammonia in freshwater (the "2013 Criteria")[14]. The 2013 Criteria is an update to U.S. EPA's 1999 Criteria, and varies based on pH and temperature. Although the 2013 Criteria reflects the latest scientific knowledge on the toxicity of ammonia to certain freshwater aquatic life, including new toxicity data on sensitive freshwater mussels in the Family Unionidae, the species tested for development of the 2013 Criteria may not be present in some Central Valley waterways. The 2013 Criteria document therefore states that, "*unionid mussel species are not prevalent in some waters, such as the arid west …*" and provides that, "*In the case of ammonia, where a state demonstrates that mussels are not present on a site-specific basis, the recalculation procedure may be used to remove the mussel species from the national criteria dataset to better represent the species present at the site.*"

The Central Valley Water Board issued a 3 April 2014 *California Water Code Section 13267 Order for Information: 2013 Final Ammonia Criteria for Protection of Freshwater Aquatic Life* (13267 Order) requiring the Discharger to either participate in an individual or group study to determine the presence of mussels or submit a method of compliance for complying with effluent limitations calculated assuming mussels present using the 2013 Criteria. The Discharger submitted a letter to the Central Valley Water Board indicating their participation in the Central Valley Clean Water Association Freshwater Collaborative Mussel Study. Studies are currently underway to determine how the latest scientific knowledge on the toxicity of ammonia reflected in the 2013 Criteria can be implemented in the Central Valley Region as part of a Basin Planning effort to adopt nutrient and ammonia objectives. Until the Basin Planning process is completed, the Central Valley Water Board will continue to implement the 1999 Criteria to interpret the Basin Plan's narrative toxicity objective. The

[14] Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater, published August 2013 [EPA 822-R-13-001]

1999 NAWQC for the protection of freshwater aquatic life for total ammonia, recommends acute (1-hour average; criteria maximum concentration or CMC) standards based on pH and chronic (30-day average; criteria continuous concentration or CCC) standards based on pH and temperature. U.S. EPA also recommends that no 4-day average concentration should exceed 2.5 times the 30-day CCC. U.S. EPA found that as pH increased, both the acute and chronic toxicity of ammonia increased. Salmonids were more sensitive to acute toxicity effects than other species. However, while the acute toxicity of ammonia was not influenced by temperature, it was found that invertebrates and young fish experienced increasing chronic toxicity effects with increasing temperature. Because the Middle Fork of the Feather River has a beneficial use of cold freshwater habitat and the presence of salmonids and early fish life stages in the Middle Fork of the Feather River is well-documented, the recommended criteria for waters where salmonids and early life stages are present were used.

The maximum permitted effluent pH is 9.0, however using this value to calculate the acute criterion would be unrepresentative of instream conditions considering the dilution available. To represent conditions in the Middle Fork of the Feather River, a maximum observed downstream pH value of 8.4 was used to derive the acute criterion. The resulting acute criterion is 2.54 mg/L.

The maximum observed 30-day rolling average temperature and the maximum observed pH of the Middle Fork of the Feather River were used to calculate the 30-day CCC. The maximum observed 30-day average Middle Fork of the Feather River temperature was 38.3°F (3.5°C), for the rolling 30-day period ending 3/20/2018. The maximum observed Middle Fork of the Feather River pH value was 8.4 on 3/20/2018. Using a pH value of 8.4 and the worst-case temperature value of 38.3°F (<3.5°C) on a rolling 30-day basis, the resulting 30-day CCC is 1.27 mg/L (as N). The 4-day average concentration is derived in accordance with the U.S. EPA criterion as 2.5 times the 30-day CCC. Based on the 30-day CCC of 1.27 mg/L (as N), the 4-day average concentration that should not be exceeded is 3.17 mg/L (as N).

(b) **RPA Results.** The Facility is a POTW that treats domestic wastewater. Untreated domestic wastewater contains ammonia in concentrations that is harmful to aquatic life and exceed the Basin Plan narrative toxicity objective. Federal regulations at 40 C.F.R. §122.44(d)(1)(i) requires that, "*Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.*" For priority pollutants, the SIP dictates the procedures for conducting the RPA. Ammonia is not a priority pollutant. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Due to the site-specific conditions of the discharge, the Central Valley Water Board has used professional judgment in determining the

appropriate method for conducting the RPA for this non-priority pollutant constituent.

U.S. EPA's September 2010 NPDES Permit Writer's Manual, page 6-30, states, "*State implementation procedures might allow, or even require, a permit writer to determine reasonable potential through a qualitative assessment process without using available facility-specific effluent monitoring data or when such data are not available…A permitting authority might also determine that WQBEL's are required for specific pollutants for all facilities that exhibit certain operational or discharge characteristics (e.g., WQBEL's for pathogens in all permits for POTW's discharging to contact recreational waters).*" U.S. EPA's TSD also recommends that factors other than effluent data should be considered in the RPA, "When determining whether or not a discharge causes, has the reasonable potential to cause, or contributes to an excursion of a numeric or narrative water quality criterion for individual toxicants or for toxicity, the regulatory authority can use a variety of factors and information where facility-specific effluent monitoring data are unavailable. These factors also should be considered with available effluent monitoring data." With regard to POTW's, U.S. EPA recommends that, "*POTW's should also be characterized for the possibility of chlorine and ammonia problems.*" (TSD, p. 50)

Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate. Denitrification is a process that converts nitrate to nitrite or nitric oxide and then to nitrous oxide or nitrogen gas, which is then released to the atmosphere. Inadequate or incomplete nitrification may result in the discharge of ammonia to the receiving stream. Ammonia is known to cause toxicity to aquatic organisms in surface waters. Discharges of ammonia in concentrations that produce detrimental physiological responses to human, plant, animal, or aquatic life would violate the Basin Plan's narrative toxicity objective. Inadequate or incomplete nitrification creates the potential for ammonia to be discharged and provides the basis for the discharge to have a reasonable potential to cause or contribute to an in-stream excursion above the NAWQC. Therefore, the Central Valley Water Board finds the discharge has reasonable potential for ammonia and WQBEL's are required.

(c) **WQBEL's.** The Central Valley Water Board calculates WQBEL's in accordance with SIP procedures for non-CTR constituents, and ammonia is a non-CTR constituent. The SIP procedure assumes a 4-day averaging period for calculating the long-term average discharge condition (LTA). However, U.S. EPA recommends modifying the procedure for calculating permit limits for ammonia using a 30-day averaging period for the calculation of the LTA corresponding to the 30-day CCC. Therefore, while the LTAs corresponding to the acute and 4-day chronic criteria were calculated according to SIP procedures, the LTA corresponding to the 30-day CCC was calculated assuming a 30-day averaging period. The lowest LTA representing the acute, 4-day CCC, and 30-day CCC is then selected for deriving the average monthly effluent limitation (AMEL) and the average weekly effluent limitation (AWEL). The remainder of the WQBEL calculation for ammonia was performed according to the SIP

procedures. The previous Order did not require monitoring of background concentrations in the Middle Fork of the Feather River, and no data is available. Due to the absence of receiving water data, the Central Valley Water Board calculated WQBEL's using data collected by the neighboring Delleker WWTP in the Middle Fork of the Feather River approximately 1,000 feet upstream of the Facility discharge point D-001. The maximum concentration of ammonia in the Middle Fork of the Feather River collected between the allowable discharge dates of November to May was reported as 0.61 mg/L on 1/13/2017. This sample was used as the maximum background concentration in the Middle Fork of the Feather River for calculation of WQBEL's for the Facility. This Order contains effluent limitations, with a granted acute and chronic dilution credit of 20, of 18 mg/L (as N) for the AMEL and 34 mg/L (as N) for the AWEL, based on the acute criterion.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that the maximum average monthly concentration of 18.0 mg/L is less than or equal to the applicable WQBEL's. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

ii. **Chlorine Residual**

(a) **WQO.** U.S. EPA developed NAWQC for protection of freshwater aquatic life for chlorine residual. The recommended 4-day average (chronic) and 1-hour average (acute) criteria for chlorine residual are 0.011 mg/L and 0.019 mg/L, respectively. These criteria are protective of the Basin Plan's narrative toxicity objective.

(b) **RPA Results.** The concentrations of chlorine used to disinfect wastewater are high enough to harm aquatic life and violate the Basin Plan narrative toxicity objective if discharged to the receiving water. Reasonable potential therefore does exist and effluent limits are required.

Federal regulations at 40 C.F.R. §122.44(d)(1)(i) requires that, "*Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.*" For priority pollutants, the SIP dictates the procedures for conducting the RPA. Chlorine is not a priority pollutant. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Due to the site-specific conditions of the discharge, the Central Valley Water Board has used its judgment in determining the appropriate method for conducting the RPA for this non-priority pollutant constituent.

U.S. EPA's September 2010 NPDES Permit Writer's Manual, page 6-30, states, "*State implementation procedures might allow, or even require, a permit writer to determine reasonable potential through a qualitative assessment process without using available facility-specific effluent monitoring data or when such data are not available…A permitting authority might also determine that WQBEL's are required for specific pollutants for all facilities that exhibit certain operational or discharge*

characteristics (e.g., WQBEL's for pathogens in all permits for POTW's discharging to contact recreational waters)." U.S. EPA's TSD also recommends that factors other than effluent data should be considered in the RPA, "*When determining whether or not a discharge causes, has the reasonable potential to cause, or contributes to an excursion of a numeric or narrative water quality criterion for individual toxicants or for toxicity, the regulatory authority can use a variety of factors and information where facility-specific effluent monitoring data are unavailable. These factors also should be considered with available effluent monitoring data.*" With regard to POTW's, U.S. EPA recommends that, "*POTW's should also be characterized for the possibility of chlorine and ammonia problems.*" (TSD, p. 50)

The Discharger uses chlorine for disinfection, which is extremely toxic to aquatic organisms. Although the Discharger uses a sulfur dioxide process to dechlorinate the effluent prior to discharge to the Middle Fork of the Feather River, the existing chlorine use and the potential for chlorine to be discharged provides the basis for the discharge to have a reasonable potential to cause or contribute to an in-stream excursion above the NAWQC.

(c) **WQBEL's.** The U.S. EPA *Technical Support Document for Water Quality-Based Toxics Control* [EPA/505/2-90-001] contains statistical methods for converting chronic (4-day) and acute (1-hour) aquatic life criteria to average monthly and maximum daily effluent limitations based on the variability of the existing data and the expected frequency of monitoring. However, because chlorine is an acutely toxic constituent that can and will be monitored continuously, an average 1-hour limitation is considered more appropriate than an average daily limitation. This Order contains a 4-day average effluent limitation and 1-hour average effluent limitation for chlorine residual of 0.011 mg/L and 0.019 mg/L, respectively, based on U.S. EPA's NAWQC, which implements the Basin Plan's narrative toxicity objective for protection of aquatic life.

(d) **Plant Performance and Attainability.** Analysis of effluent data shows that immediate compliance with these effluent limitations is feasible.

iii. **Copper, Total Recoverable**

(a) **WQO.** The CTR includes hardness-dependent criteria for the protection of freshwater aquatic life for copper. These criteria for copper are presented in dissolved concentrations, as 1-hour acute criteria and 4-day chronic criteria.

(b) **RPA Results.** Section IV.C.2 of this Fact Sheet includes procedures for conducting the RPA for hardness-dependent CTR metals, such as copper. The CTR includes hardness-dependent criteria for copper for the receiving water. The maximum observed upstream receiving water copper concentration was <2 µg/L, based on 1 sample collected in October 2015. The RPA was conducted using the upstream receiving water hardness to calculate the criteria for comparison to the maximum ambient background concentration, and likewise using the reasonable worst-case downstream hardness to compare the maximum effluent concentration. The table below shows the specific criteria used for the RPA.

	CTR Chronic Criterion (Total Recoverable)	Maximum Concentration (Total Recoverable)	Reasonable Potential? (Y/N)
Receiving Water	3.1 µg/L [1]	<2 µg/L	No [3]
Effluent	6.5 µg/L [2]	13 µg/L	Yes [4]

[1] Based on lowest observed upstream hardness of 28 mg/L (as $CaCO_3$)
[2] Based on reasonable worst-case downstream hardness of 65 mg/L (as $CaCO_3$)
[3] Per Section 1.3, step 4 of the SIP.
[4] Per Section 1.3, step 6 of the SIP.

Based on the available data, copper in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the CTR criteria for the protection of freshwater aquatic life

(c) **WQBEL's.** The receiving water contains assimilative capacity for copper, therefore, a chronic dilution credit of 20:1 and acute dilution credit of 20:1 was granted for the development of the WQBELs for copper. This Order contains a final average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL) for copper of 26 µg/L and 53 µg/L, respectively, based on the CTR criterion for the protection of freshwater aquatic life.

(d) **Plant Performance and Attainability.** Analysis of the effluent data shows that immediate compliance with these effluent limitations is feasible.

iv. **Pathogens**

(a) **WQO.** In a letter to the Central Valley Water Board dated 8 April 1999, DDW indicated it would consider wastewater discharged to water bodies with identified beneficial uses of irrigation or contact recreation and where the wastewater receives dilution of more than 20:1 to be adequately disinfected if the effluent coliform concentration does not exceed 23 MPN/100 mL as a 7-day median and if the effluent coliform concentration does not exceed 240 MPN/100 mL more than once in any 30 day period.

(b) **RPA Results.** Municipal and domestic supply and body contact water recreation are beneficial uses of the Middle Fork of the Feather River. The discharge prohibition requires a minimum of 50:1 dilution in the Middle Fork of the Feather River. Therefore, the DDW requirements are applicable to the discharge.

(c) **WQBEL's.** Pursuant to guidance from DDW, this Order includes effluent limitations for total coliform organisms of 23 MPN/100 mL as a 7-day median and 240 MPN/100 mL, not to be exceeded more than once in a 30-day period. These coliform limits are imposed to protect the beneficial uses of the receiving water, including public health through contact recreation and drinking water pathways.

(d) **Plant Performance and Attainability.** Analysis of effluent data shows that immediate compliance with these effluent limitations is feasible.

v. **Salinity**

(a) **WQO.** The Basin Plan contains a site-specific EC objective of 150 µmhos/cm (90th percentile) based upon previous 10 years of record for

the Middle Fork of the Feather River. The Basin Plan also contains a chemical constituent objective that incorporates state MCLs, contains a narrative objective, and contains numeric water quality objectives for certain specified water bodies for electrical conductivity, total dissolved solids, sulfate, and chloride. The U.S. EPA Ambient Water Quality Criteria for Chloride recommends acute and chronic criteria for the protection of aquatic life. There are no U.S. EPA water quality criteria for the protection of aquatic life for electrical conductivity, total dissolved solids, and sulfate. Additionally, there are no U.S. EPA numeric water quality criteria for the protection of agricultural, livestock, and industrial uses. Numeric values for the protection of these uses are typically based on site specific conditions and evaluations to determine the appropriate constituent threshold necessary to interpret the narrative chemical constituent Basin Plan objective. The Central Valley Water Board must determine the applicable numeric limit to implement the narrative objective for the protection of agricultural supply. The Central Valley Water Board is currently implementing the CV-SALTS initiative to develop a Basin Plan Amendment that will establish a salt and nitrate Management Plan for the Central Valley. Through this effort the Basin Plan will be amended to define how the narrative water quality objective is to be interpreted for the protection of agricultural use. All studies conducted through this Order to establish an agricultural limit to implement the narrative objective will be reviewed by and consistent with the efforts currently underway by CV-SALTS.

Table F-9. Salinity Water Quality Criteria/Objectives

Parameter	Agricultural WQ Objective[1]	Secondary MCL[2]	U.S. EPA NAWQC	Effluent[4]	
				Average	Maximum[3]
EC (µmhos/cm) or TDS (mg/L)	Varies	EC: 900, 1600, 2200 or TDS: 500, 1000, 1500	N/A	445[5]	532[5]
Sulfate (mg/L)	Varies	250, 500, 600	N/A	No data	No data
Chloride (mg/L)	Varies	250, 500, 600	860 1-hr 230 4-day	44	54

1 Narrative chemical constituent objective of the Basin Plan. Procedures for establishing the applicable numeric limitation to implement the narrative objective can be found in the Policy for Application of Water Quality, Chapter IV, Section 8 of the Basin Plan. However, the Basin Plan does not require improvement over naturally occurring background concentrations. In cases where the natural background concentration of a particular constituent exceeds an applicable water quality objective, the natural background concentration will be considered to comply with the objective.

2 The secondary MCLs are for protection of public welfare and are stated as a recommended level, upper level, and a short-term maximum level.

3 Maximum calendar annual average.

4 Data provided by Discharger since Order R5-2009-0093 effective date to May 2018.

5 EC values

(1) **Chloride.** The Secondary MCL for chloride is 250 mg/L, as a recommended level, 500 mg/L as an upper level, and 600 mg/L as a short-term maximum.

(2) **Electrical Conductivity or Total Dissolved Solids.** The Secondary MCL for EC is 900 µmhos/cm as a recommended level, 1600 µmhos/cm as an upper level, and 2200 µmhos/cm as a short-term maximum, or when expressed as TDS is 500 mg/L as a recommended level, 1000 mg/L as an upper level, and 1500 mg/L as a short-term maximum. The Basin Plan contains a site-specific EC limit of **150 µmhos/cm (90th percentile)** based upon previous 10 years of record for the Middle Fork of the Feather River.

(3) **Sulfate.** The Secondary MCL for sulfate is 250 mg/L as a recommended level, 500 mg/L as an upper level, and 600 mg/L as a short-term maximum.

(b) **RPA Results.**

(1) **Chloride.** Chloride concentrations in the effluent ranged from 34 mg/L to 54 mg/L, with an average of 44 mg/L. These levels do not exceed the Secondary MCL. The previous Order did not require monitoring of background chloride concentrations in the Middle Fork of the Feather River, and no data is available. Due to the limited receiving water data, the Central Valley Water Board finds that the dataset is insufficient to determine if the discharge exhibits reasonable potential to cause or contribute to an exceedance of the Secondary MCL. Therefore, this Order does not establish WQBEL's for chloride. Instead of limitations, yearly effluent and receiving water monitoring for chloride has been established. Should monitoring results indicate that the discharge has the reasonable potential to cause or contribute to an exceedance of the Secondary MCL, this Order may be reopened and modified by adding appropriate effluent limitations.

(2) **Electrical Conductivity or Total Dissolved Solids.** A review of the Discharger's monitoring reports from the previous effective permit date shows an average effluent EC of 445 µmhos/cm, with a range from 260 µmhos/cm to 1300 µmhos/cm. These levels exceed the Basin Plan site-specific EC limit of 150 µmhos/cm in well mixed waters of the Middle Fork of the Feather River based upon previous 10 years of record. The previous Order did not require monitoring of background concentrations for EC in the Middle Fork of the Feather River, and no data is available. However, monthly sampling of a downstream location (RSW-003) from the effective date of the previous Order shows an average EC of 159 µmhos/cm. Therefore, it can be assumed that EC in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan site specific limit until additional data is received to determine background concentration in the Middle Fork of the Feather River.

The average TDS effluent concentration was 266 mg/L with concentrations ranging from 160 mg/L to 360 mg/L. These levels do not exceed the Secondary MCL TDS limit of 500.

(3) **Sulfate.** The previous Order did not require monitoring of sulfate effluent and no data is available. The previous Order did not require monitoring of background sulfate concentrations in the Middle Fork of the Feather River, and no data is available. Due to the limited receiving water data, the Central Valley Water Board finds that the dataset is insufficient to determine if the discharge exhibits reasonable potential to cause or contribute to an exceedance of the Secondary MCL. Therefore, this Order does not establish WQBEL's for sulfate. Instead of limitations, yearly effluent and receiving water monitoring for sulfate has been established. Should monitoring results indicate that the discharge has the reasonable potential to cause or contribute to an exceedance of the Secondary MCL, this Order may be reopened and modified by adding appropriate effluent limitations.

(c) **WQBEL's.** Effluent limitations based on the MCL or the Basin Plan would likely require construction and operation of a reverse osmosis treatment plant. The State Water Board, in Water Quality Order 2005-005 (for the City of Manteca), states, "*…the State Board takes official notice [pursuant to Title 23 of California Code of Regulations, Section 648.2] of the fact that operation of a large-scale reverse osmosis treatment plant would result in production of highly saline brine for which an acceptable method of disposal would have to be developed. Consequently, any decision that would require use of reverse osmosis to treat the City's municipal wastewater effluent on a large scale should involve thorough consideration of the expected environmental effects.*" The State Water Board states in that Order, "*Although the ultimate solution to southern Delta salinity problems have not yet been determined, previous actions establish that the State Board intended for permit limitations to play a limited role with respect to achieving compliance with the EC water quality objectives in the southern Delta.*" The State Water Board goes on to say, "*Construction and operation of reverse osmosis facilities to treat discharges…prior to implementation of other measures to reduce the salt load in the southern Delta, would not be a reasonable approach*."

The Central Valley Water Board, with cooperation of the State Water Board, has begun the process to develop a new policy for the regulation of salinity in the Central Valley. In a statement issued at the 16 March 2006, Central Valley Water Board meeting, Board Member Dr. Karl Longley recommended that the Central Valley Water Board continue to exercise its authority to regulate discharges of salt to minimize salinity increases within the Central Valley. Dr. Longley stated, "*The process of developing new salinity control policies does not, therefore, mean that we should stop regulating salt discharges until a salinity Policy is developed. In the meantime, the Board should consider all possible interim approaches to continue controlling and regulating salts in a reasonable manner, and encourage all stakeholder groups that may be affected by the Regional Board's policy to actively participate in policy development.*"

The maximum effluent concentration (MEC) for EC was 1300 µmhos/cm with an overall average of 445 µmhos/cm. There is no EC data available for upstream receiving water but the Discharger has collected EC samples at a downstream location since the previous Order became effective with

an average of 159 µmhos/cm. Therefore, EC in the discharge has a reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan site specific limit.

Until the Central Valley Water Board completes development of a new salinity policy for the Central Valley, this Order includes an interim performance-based annual average effluent limitation of **684** µmhos/cm for EC. This interim performance-based effluent limitation maintains the existing effluent limitation in the previous Order and an annual average is used due to the intermittent the discharge.

The State Antidegradation Policy (Resolution No. 68-16) requires that the Discharger implement best practicable treatment or control (BPTC) of its discharge. For salinity, the Central Valley Water Board is considering limiting effluent salinity of municipal wastewater treatment plants to an increment of 500 µmhos/cm over the salinity of the municipal water supply as representing BPTC. This Order includes an interim performance-based effluent limitation for EC but no final effluent limitation because sufficient information does not exist for the water supply for the Discharger. This Order requires quarterly monitoring of EC and TDS of the Discharger's influent (see Attachment E sections III.A. and IX.B.).

This Order also requires the Discharger to implement pollution prevention measures to reduce the salinity in its discharge to the Middle Fork of the Feather River. Specifically, the Special Provision contained in VI.C.3.a requires the Discharger to prepare and implement a Salinity Evaluation and Minimization Plan report and report on progress in reducing salinity discharges to the Middle Fork of the Feather River and the Special Provision contained in VI.C.2.e requires a Salinity/EC Site-Specific Study. Implementation measures to reduce salt loading may include source control, mineralization reduction, chemical addition reductions, changing to water supplies with lower salinity, and limiting the salt load from domestic and industrial dischargers. Compliance with these requirements will result in a salinity reduction in the effluent discharged to the receiving water; however, the discharge may cause or contribute to an exceedance of a water quality objective for salinity until adequate measures are implemented to meet those objectives.

(d) **Plant Performance and Attainability.** Analysis of effluent data shows that immediate compliance with these effluent limitations is feasible.

4. WQBEL Calculations

a. This Order includes WQBEL's for ammonia, chlorine residual, total recoverable copper, pathogens, and salinity. The general methodology for calculating WQBEL's based on the different criteria/objectives is described in subsections IV.C.5.b through e, below. See Attachment H for the WQBEL calculations.

b. **Effluent Concentration Allowance.** For each water quality criterion/objective, the ECA is calculated using the following steady-state mass balance equation from Section 1.4 of the SIP:

ECA = C + D(C – B) *where C>B, and*
ECA = C *where C≤B*

where:

ECA = effluent concentration allowance
D = dilution credit
C = the priority pollutant criterion/objective
B = the ambient background concentration.

According to the SIP, the ambient background concentration (B) in the equation above shall be the observed maximum with the exception that an ECA calculated from a priority pollutant criterion/objective that is intended to protect human health from carcinogenic effects shall use the arithmetic mean concentration of the ambient background samples.

c. **Primary and Secondary MCLs.** For non-priority pollutants with primary MCL's to protect human health (e.g., nitrate plus nitrite), the AMEL is set equal to the primary MCL and the AWEL is calculated using the MDEL/AMEL multiplier from Table 2 of the SIP.

For non-priority pollutants with secondary MCL's that protect public welfare (e.g., taste, odor, and staining), WQBEL's were calculated by setting the LTA equal to the secondary MCL and using the AMEL multiplier to set the AMEL. The AWEL was calculated using the MDEL/AMEL multiplier from Table 2 of the SIP.

d. **Aquatic Toxicity Criteria.** For priority pollutants with acute and chronic aquatic toxicity criteria, the WQBEL's are calculated in accordance with Section 1.4 of the SIP. The ECAs are converted to equivalent long-term averages (i.e. LTAacute and LTAchronic) using statistical multipliers and the lowest LTA is used to calculate the AMEL and MDEL using additional statistical multipliers. For non-priority pollutants, WQBEL's are calculated using similar procedures, except that an AWEL is determined utilizing multipliers based on a 98th percentile occurrence probability.

e. **Human Health Criteria.** For priority pollutants with human health criteria, the WQBEL's are calculated in accordance with Section 1.4 of the SIP. The AMEL is set equal to the ECA and the MDEL is calculated using the MDEL/AMEL multiplier from Table 2 of the SIP. For non-priority pollutants with human health criteria, WQBEL's are calculated using similar procedures, except that an AWEL is established using the MDEL/AMEL multiplier from Table 2 of the SIP.

$$AMEL = mult_{AMEL}\left[\min\left(\overbrace{M_A ECA_{acute}}^{LTA_{acute}}, M_C ECA_{chronic}\right)\right]$$

$$MDEL = mult_{MDEL}\left[\min\left(M_A ECA_{acute}, \underbrace{M_C ECA_{chronic}}_{LTA_{chronic}}\right)\right]$$

$$MDEL_{HH} = \left(\frac{mult_{MDEL}}{mult_{AMEL}}\right) AMEL_{HH}$$

where:
$mult_{AMEL}$ = statistical multiplier converting minimum LTA to AMEL
$mult_{MDEL}$ = statistical multiplier converting minimum LTA to MDEL
M_A = statistical multiplier converting acute ECA to LTA_{acute}
M_C = statistical multiplier converting chronic ECA to $LTA_{chronic}$

Summary of Water Quality-Based Effluent Limitations
Discharge Point No. D-001

Table F-10. Summary of Water Quality-Based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Ammonia (as N)	mg/L	18	34	--	--	--
Ammonia (as N)	lbs/day[6]	150	292	--	--	--
Chlorine, Total Residual	mg/L	--	0.011[1]	0.019[2]	--	--
Copper, Total Recoverable	µg/L	26	--	53	--	--
Electrical Conductivity @ 25°C	µmhos/cm	684[3]	--	--	--	--
Total Coliform	MPN/100 mL		23[4]	240[5]	--	--

1 Applied as a 4-day average effluent limitation
2 Applied as a 1-hour average effluent limitation
3 Applied as a calendar annual average effluent limitation
4 Applied as a 7-day median effluent limitation
5 Not to be exceeded more than once in any 30-day period
6 Based on peak wet weather flow of 1.0 MGD

5. Whole Effluent Toxicity (WET)

For compliance with the Basin Plan's narrative toxicity objective, this Order requires the Discharger to conduct whole effluent toxicity testing for acute and chronic toxicity, as specified in the Monitoring and Reporting Program (Attachment E, Section V). This Order also contains effluent limitations for acute toxicity and requires the Discharger to implement best management practices to investigate the causes of, and identify corrective actions to reduce or eliminate effluent toxicity.

a. **Acute Aquatic Toxicity.** The Basin Plan contains a narrative toxicity objective that states, "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.*" (Basin Plan at page). The Basin Plan also states that, "*…effluent limits based upon acute biotoxicity tests of effluents will be prescribed where appropriate…*".

For priority pollutants, the SIP dictates the procedures for conducting the RPA. Acute toxicity is not a priority pollutant. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Acute whole effluent toxicity is not a

priority pollutant. Therefore, due to the site-specific conditions of the discharge, the Central Valley Water Board has used professional judgment in determining the appropriate method for conducting the RPA. U.S. EPA's September 2010 NPDES Permit Writer's Manual, page 6-30, states, "*State implementation procedures might allow, or even require, a permit writer to determine reasonable potential through a qualitative assessment process without using available facility-specific effluent monitoring data or when such data are not available…A permitting authority might also determine that WQBEL's are required for specific pollutants for all facilities that exhibit certain operational or discharge characteristics (e.g., WQBEL's for pathogens in all permits for POTW's discharging to contact recreational waters).*" Although the discharge has been consistently in compliance with the acute effluent limitations, the Facility is a POTW that treats domestic wastewater containing ammonia and other acutely toxic pollutants. Acute toxicity effluent limits are required to ensure compliance with the Basin Plan's narrative toxicity objective.

U.S. EPA Region 9 provided guidance for the development of acute toxicity effluent limitations in the absence of numeric water quality objectives for toxicity in its document titled "Guidance for NPDES Permit Issuance", dated February 1994. In section B.2. "Toxicity Requirements" (pgs. 14-15) it states that, "*In the absence of specific numeric water quality objectives for acute and chronic toxicity, the narrative criterion 'no toxics in toxic amounts' applies. Achievement of the narrative criterion, as applied herein, means that ambient waters shall not demonstrate for acute toxicity: 1) less than 90% survival, 50% of the time, based on the monthly median, or 2) less than 70% survival, 10% of the time, based on any monthly median. For chronic toxicity, ambient waters shall not demonstrate a test result of greater than 1 TUc.*" Accordingly, effluent limitations for acute toxicity have been included in this Order as follows:

Acute Toxicity. Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than:

Minimum for any one bioassay	70%
Median for any three consecutive bioassays	90%

b. **Chronic Aquatic Toxicity.** The Basin Plan contains a narrative toxicity objective that states, "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.*" (Basin Plan at page III-8.00). The table below is chronic WET testing performed by the Discharger from 2/22/2010 through 3/26/2010. This data was used to determine if the discharge has reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan's narrative toxicity objective.

Table F-11. Whole Effluent Chronic Toxicity Testing Results

	Fathead Minnow *Pimephales promelas*		**Water Flea** *Ceriodaphnia dubia*		**Green Algae** *Selenastrum capricornutum*
Date	Survival (TUc)	Growth (TUc)	Survival (TUc)	Reproduction (TUc)	Growth (TUc)
2/22/2010	1[1]	1[1]	1	1.9	1.9
3/24/2010	1[1]	1[1]	-	-	-

[1] Dilution water did not meet survival test acceptability criteria